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tales originated, the first group retaining the characters of the primitive type;" and that the Lycopodiales "may perhaps be regarded as an extreme case of leaf reduction in one of these lines."—J. M. C.

Apogamy in Hieracium.—ROSENBERG²³ finds that in *Hieracium auricula* and *H. venosum* the development of pollen and embryo sacs is normal and fertilization occurs regularly; there are 9 chromosomes in the gametophyte, 18 in the sporophyte, and 27 in the endosperm. Most species of *Hieracium*, however, are apogamous, and their embryo sacs are formed without any reduction division. Usually they do not arise from megaspores, but from cells of the integument or chalaza; that is, the gametophyte is aposporous and contains the sporophytic number of chromosomes. In *H. excellens* an embryo sac with the reduced number of chromosomes is often formed, but there are usually aposporous sacs in the same head. This shows why *H. excellens*, in spite of its being apogamous, may also produce hybrids.—CHARLES J. CHAMBERLAIN.

Geographic distribution of closely related species.—LEAVITT²⁴ has published a study of the distribution of species in reference to their evolution. The topics discussed are "the effects of different evolutionary agencies upon specific distribution," "the necessity of isolation and Mendelian inheritance," "specific distribution in the animal kingdom," "the distribution of plants," and "evidence from North American Orchidaceae." The problems are stated and solutions are not attempted, but the impression of the author is that a study of the specific distribution of plants is not likely to be unfavorable to mutation as one method of evolution. He thinks that "the adherents of mutation will be able to bring forward enough cases of social distribution to render phytogeographic weapons useless in the attack upon this theory."—J. M. C.

Cytology of apospory.—*Nephrodium pseudo-mas* Rich. var. *cristata apospora* Drury, according to Miss DIGBY,²⁵ shows almost all grades of apospory and apogamy except parthenogenesis. Several fronds pegged down quickly produced prothallia at the tips of the leaves, and these prothallia within three weeks bear apogamous embryos. Antheridia are not uncommon, but no archegonia could be found. The number of chromosomes in cells of the leaf, aposporous prothallia, and in the apogamous embryos is about 50, there being no reduction of chromosomes. In *N. pseudo-mas* Rich. var. *polydactyla* Wills, migrating nuclei, some of which have been seen to fuse, are a characteristic feature; while in the var. *cristata apospora* Drury there seems to be no migration or fusion of nuclei.—CHARLES J. CHAMBERLAIN.

²³ ROSENBERG, O., Cytological studies on the apogamy in *Hieracium*. Bot. Tidsskrift **28**:143-170. pls. 1-2. 1907.

²⁴ LEAVITT, ROBERT GREENLEAF, The geographic distribution of closely related species. Amer. Nat. **41**:207-240. 1907.

²⁵ DIGBY, L., On the cytology of apogamy and apospory. II. Preliminary note on apospory. Proc. Roy. Soc. London **76**:463-467. 1905.